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Dr. Gustafson
MATH 361  HW 2.5

✓ ✓ ✓

#3,4,8

## Problem 3

$$g^{(x)} = \cos(x-1) \, , \quad p_0^{(0)} = 2$$

$$p_1^{(0)} = g(p_0^{(0)}) = 0.5403023059$$

$$p_2^{(0)} = g(p_1^{(0)}) = 0.8961866647$$

$$p_0^{(1)} = p_0^{(0)} - \frac{(\Delta p_0^{(0)})^2}{\Delta^2 p_0^{(0)2}} = 0.8264273957$$

$$\boxed{p_0^{(1)} = 0.8264273957}$$

$$g(x) = 1 + (\sin(x))^2 \quad, \quad P_0^{(0)} = 1$$

$$P_1^{(0)} = g(P_0^{(0)}) = 1.708073418$$

$$P_2^{(0)} = g(P_1^{(0)}) = 1.981273081$$

$$P_0^{(1)} = P_0^{(0)} - \frac{(\Delta P_0^{(0)})^2}{\Delta^2 P_0^{(0)2}} = 2.152904629$$

$$P_1^{(1)} = g(P_0^{(1)}) = 1.697735097$$

$$P_2^{(1)} = g(P_1^{(1)}) = 1.983972911$$

$$P_0^{(2)} = P_0^{(1)} - \frac{(\Delta P_0^{(1)})^2}{\Delta^2 P_0^{(1)2}} = 1.873464044$$

$$\boxed{P_0^{(1)} = 2.152904629 \quad, \quad P_0^{(2)} = 1.873464044}$$

## Problem 8

$$g(x) = x - 2^{-x} = 0, \in [0,1] \quad \text{accurate to} \quad 10^{-4}, \quad P_0^{(0)} = 0.5$$

$$P_1^{(0)} = g(P_0^{(0)}) = 0.7071067812$$
$$P_2^{(0)} = g(P_1^{(0)}) = 0.6125473265$$
$$P_0^{(1)} = P_0^{(0)} - \frac{(\Delta P_0^{(0)})^2}{\Delta^2 P_0^{(0)2}} = 0.6421876687$$

$$P_1^{(1)} = g(P_0^{(1)}) = 0.6407406078$$
$$P_2^{(1)} = g(P_1^{(1)}) = 0.6413836098$$
$$P_0^{(2)} = P_0^{(1)} - \frac{(\Delta P_0^{(1)})^2}{\Delta^2 P_0^{(1)2}} = 0.6411857921$$

$$P_1^{(2)} = g(P_0^{(2)}) = 0.6411857234$$
$$P_2^{(2)} = g(P_1^{(2)}) = 0.6411857539$$
$$P_0^{(3)} = P_0^{(2)} - \frac{(\Delta P_0^{(2)})^2}{\Delta^2 P_0^{(2)2}} = 0.6411857445$$

$$\boxed{P_0^{(3)} = 0.6411857445}$$